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Chairman Petri and Members of the Subcommittee: I appreciate this opportunity to appear before you today to testify on "Driver Distractions: Electronic Devices in the Automobile." My colleagues and I at the National Highway Traffic Safety Administration (NHTSA) look forward to working with the Subcommittee on this important issue.

NHTSA's statutory mission is to prevent deaths and injuries from motor vehicle crashes. We do this in the area of highway safety through grant programs, technical assistance and research to help States and communities solve their highway safety problems. NHTSA's highway safety behavioral research program, authorized by section 403 of title 23 of the United States Code, supports State and community highway safety programs and activities. We also conduct research on the safety of motor vehicles and the interaction between motor vehicles and drivers. NHTSA's sister agency, the Federal Motor Carrier Safety Administration, also plays an important role in work related to electronic devices and associated driver distraction issues involving commercial motor vehicles.

I would like to begin by giving a brief overview of our current understanding about the nature and scope of driver distraction as it relates to electronic devices brought into, installed or integrated in motor vehicles, and then describe NHTSA's past research and future research plans in this area.

DRIVER DISTRACTION, TELEMATICS AND HIGHWAY SAFETY

To drive safely, a driver needs to give priority attention to the driving task. Even a momentary distraction can lead to a crash. The distraction can be caused by

anything that draws the driver's attention away from the road. Based on a 1996 NHTSA study, the agency estimates that driver distraction in all of its various forms probably contributes to between 20 and 30 percent of all crashes. Exact statistics may never be known due to the difficulty of determining driver actions prior to a crash.

Research studies have long shown that people are limited in the amount of information they can process during any given period of time. To cope with the multiple demands that occur during driving, drivers have to shift their attention back and forth to attend to each of them. Most of the time drivers are able to do this quite well. But we know that if distraction occurs at an inappropriate time or if it is prolonged, attention to driving is reduced and safety can be jeopardized.

There have always been distractions while driving -- tuning a radio, eating, or attending to a child. Our problem now is to understand a new set of distractions associated with an ever-growing array of new in-vehicle electronic devices, referred to as "telematics," rapidly being developed by the electronics and automobile industries. The devices that are receiving NHTSA's main attention are cell phones, route navigation systems, on-board computers that deliver personalized Internet-based information, and other multifunction systems. One developer predicts that by 2005 all new cars will have some form of on-board computer accessible to the driver. The speed from innovation to installation is so fast that the public's first awareness of a product or service may well be when it is already being designed into or carried into a vehicle and used by drivers on the road.

Today, one telematic device in particular - the cell phone - has become a significant highway safety concern. Over 110 million people use cell phones in the United States, a number that is expected to continue to grow. A NHTSA survey, completed in January 2001 and scheduled for public release this summer, found that 54 percent of motor vehicle drivers in the United States usually have a cell phone in their vehicles or carry cell phones when they drive. Almost 80 percent of these drivers leave their cell phone turned on while driving, and 73 percent report having talked on the phones while driving.

The new technologies have safety benefits. Cell phone users place over 98,000 emergency calls each day, many from their motor vehicles. Studies have shown that cell phones often reduce emergency response times and actually save lives. In many respects these new technologies may make it easier for people to drive more safely.

For a number of years, policymakers have been weighing the benefits of wireless technology in cars against the growing evidence of their potential to increase driver distraction and the risks to highway safety. Though no State bans the use of cell phones in motor vehicles, since 1995 more than half of the States have considered various restrictions on the use of hand-held cell phones by drivers.

Three States -- California, Massachusetts, and Florida -- impose minor restrictions on cell phone use in cars. (For example, Massachusetts permits cell phones if they do not interfere with driving and drivers keep one hand on the steering wheel at all times.) Thus far in 2001, at least 27 States have considered various measures that address the use of cell phones and other technology in motor vehicles. Eleven local jurisdictions now prohibit drivers from using hand-held phones while driving.

NHTSA'S RESEARCH ON DRIVER DISTRACTION

To evaluate the contribution of driver distraction to crashes, NHTSA began conducting research in 1991 on the relationship between distractions and driving performance. Using instrumented vehicles, the agency has been studying the relative demands of different types of systems, including audio system controls, navigation systems, and cell phones. A significant portion of this research was conducted as part of DOT's Intelligent Transportation Systems (ITS) program, coordinated by the ITS Joint Program Office in the Federal Highway Administration (FHWA).

NHTSA's past research efforts in this area highlight both the complexity of measuring driver distraction and the difficulties involved in trying to establish a causal link between driver distraction and crashes.

The main interest of our *Truck Driver Workload Study* (1992-1995), published in 1995, which used professional truck drivers on-the-road, was whether driver workload could be used to measure distraction. We wanted to develop workload measures relevant to safety that could be used to evaluate distractions associated with various in-vehicle devices. The study found that the most viable approach is to do comparative assessments of these technologies. For example, it is relatively simple to determine how much longer it takes for drivers to enter a destination into a route navigation system than tuning the radio. However it is extremely difficult to estimate the number of crashes every year that can be attributed to entering a destination into a route navigation system. The study also developed several analytical tools to assess work load, including where the driver is looking and how well the driver is able to stay in the lane, that have been widely accepted and have been the foundation of much of our later research.

NHTSA also was involved in the safety evaluation of operational tests of several route navigation systems. One of the first studies, published in 1996, was the TravTek project in Orlando, Florida. The project's purpose was to evaluate the travel time and safety impact of TravTek route navigation systems, manufactured by General Motors Corporation. These systems were placed in a fleet of 100 rental vehicles that were made available to volunteer drivers. A key feature of the

system was that it could not be programmed while the vehicles were in motion. The results of this test showed that when the TravTek system was locked in this way, there were no adverse safety consequences.

A NHTSA study on wireless communications completed in 1997 investigated the safety implications of using cell phones while driving. This study, which analyzed survey, crash, anecdotal and research data, concluded that the inattention and distraction created by the use of a cell phone while driving, while similar to that associated with other distractions, in some cases can increase the risk of a crash. Among these cases, conversation appeared to be most associated with the crashes reviewed. However, the study also concluded that the data were insufficient to indicate the magnitude of any safety-related problem associated with using a cell phone while driving.

In a study published in July 2000, we also looked at driver performance when destinations are entered into route navigation systems while vehicles are in motion. For this study, we evaluated four commercially available route navigation systems: three used visual-manual methods for entry, and one used voice commands to control entry. On our test track, we evaluated the distraction effects of destination entry using each of the four systems, as well as for cell-phone dialing and radio tuning. We also compared the performance of these tasks by younger subjects (35 years old and under) to that of older subjects (55 years old and over).

We found that all tasks were distracting to the driver. Generally, the use of the voice-activated system was less distracting than any of the visual-manual systems. Radio tuning and cell-phone dialing were less distracting than visual-manual destination entry, but not much different from voice-activated destination entry. Older drivers also had much more difficulty using the visual-manual entry systems than did the younger drivers. However, for the voice-activated system, the older drivers did as well as the younger drivers.

NHTSA recently conducted a pilot test to develop a test-track protocol for measuring the trade-offs drivers make between driving tasks and secondary tasks, like dialing phone numbers and changing CDs. We developed the protocol as part of our research to assess the potential safety implications of driver distractions and to show the effects of distraction on common driving tasks. NBC's *Dateline* taped the test and plans to highlight it in an upcoming program.

NHTSA is currently conducting several related studies. One, our *Wireless Telephone Interface Study*, which continues our cell phone work under real-world driving conditions, not on a test track, is comparing driver distraction as a function of hand-held versus hands-free cell phone use while allowing drivers to select their own routes and initiate calls freely. The study includes different types of cell phones - manual dialing hand-held, manual dialing hands-free, and voice-

activated dialing hands-free - to compare their respective workload and distraction potential. We expect to complete the study by this fall.

Another NHTSA study on a test track is investigating the effects of voice technology on driving performance. One of the main objectives of this study, which we are doing cooperatively with Transport Canada, is to assess the distraction potential of manual versus voice-activated versions of such tasks as dialing a phone, tuning a radio, and retrieving e-mail messages.

Finally, NHTSA is playing a leading role in DOT's Intelligent Vehicle Initiative (IVI), a multi-agency program focused on using advanced technology to help drivers avoid crashes. One of the primary goals of this program is to ensure that the introduction of in-vehicle technologies, such as cell phones, navigation systems, and on-board computers that deliver Internet-based information, do not adversely affect safety. In fact, many of the studies mentioned earlier were carried out under the IVI program, which is coordinated by the ITS Joint Program Office in FHWA.

NHTSA'S OTHER DRIVER DISTRACTION INITIATIVES

To supplement our research efforts and explore new directions for research, the agency completed three activities last year to identify gaps in knowledge about distraction and traffic safety: (1) a public meeting on July 18; (2) an Internet forum between July 5 - August 11; and (3) expert workshops on September 28 and October 11.

1) The public meeting helped us gather information about the safety impact of using in-vehicle technologies such as cell phones, navigation systems, wireless Internet, and night vision systems, and to call national attention to this issue. The agency convened all of the stakeholders in this process - researchers, industry, representatives of the public, government, and safety groups - to share viewpoints, information and recommendations concerning the growing problem of driver distraction.

The overall focus of the meeting concerned the difficulties drivers can have when they take their eyes and minds off the road to operate these devices. Other goals were to develop a common understanding of the direction of these technologies; determine how to measure the characteristics and nature of the safety problems; and learn about new initiatives to minimize the safety problems, including current research findings and directions. Finally, we wanted to provide background information for discussions at a planned, technical workshop of experts who were tasked with identifying needed research in this area.

Three points in particular were stressed by those who spoke at the public meeting:

- First, the in-vehicle electronic devices currently installed in motor vehicles are not being fully evaluated by the industry for their potential to cause driver distraction.

- Second, much additional research needs to be done to understand more about how in-vehicle technologies can degrade a driver's ability to drive safely, increase a driver's physical and mental workload, impose added management demands on a driver, and affect different groups of drivers, particularly different age groups.

- Third, data are lacking to define the extent and magnitude of driver distraction-related crashes associated with in-vehicle electronic devices, a problem that should be addressed on an urgent basis.

On the last point, NHTSA is encouraging State and local agencies to provide driver distraction and inattention information on their crash report forms. We especially need good quality data on cell phone use and the use of other in-vehicle electronic devices as related to crashes. Data collection programs that include this information are essential to our determination of whether driver distraction results from the use of particular technologies.

2) The Internet forum gave technical experts and the public, both in the U.S. and internationally, the opportunity to download research papers on distracted driving, ask questions, share experiences and exchange views on the use of in-vehicle electronic devices. Most of the issues discussed focused on distraction problems related to the use of cell phones while driving. The entire forum is posted on NHTSA's web site: http://www.nhtsa.dot.gov/.

Sixteen technical papers written for the forum, submitted from the U.S., Canada, and several European countries, were posted on our web site. Among the technical papers, several included studies of various experimental procedures and measurements that are being proposed or currently employed to quantify the visual and the cognitive demand of using in-vehicle technologies. An "Ask the Expert" feature included 15 technical experts who volunteered their time to answer questions. In all, the forum's site had over 23,000 visits by over 9,500 unique users, 2,600 of whom registered as guests, and we received over 700 comments.

3) The purpose of the expert workshops was to identify research needed to advance the understanding of driver distraction and its possible solutions. Five topic areas were addressed: (1) Understanding the Nature and Extent of the Driver Distraction Problem; (2) Understanding the Human Cognitive Process as it Relates to Driving, Distraction and Safety; (3) Human Factors Guidelines to Aid in Equipment Design; (4) Integrated Approaches to Reduce Distraction from In-

Vehicle Devices; and (5) Ways to Effect Social Change Regarding the Use of Distracting Devices While Driving.

For each of these topic areas, we convened a working group of between 10-15 participants. Over 50 experts from a wide range of industries and safety organizations participated, including representatives from the automobile manufacturers and system suppliers, academia, research firms, enforcement agencies, and individuals associated with various trade associations and highway safety organizations. In all, nearly 100 research topics and issues and over 20 research problem statements were identified.

As a result of the information we gathered from our public meeting, Internet forum, and the agency-conducted expert workshops, NHTSA is planning to undertake the following:

- Continue research to understand the factors that affect a driver's performance while using various in-vehicle technologies such as cell phones, navigation systems, on-board personal computers, and other in-vehicle technologies. The objective is to quantify how a driver's use of this technology affects their safe-driving performance.

- Work with industry to support the development of test procedures and guidelines that can be used to design equipment that minimizes driver distraction.

- Pursue consumer and public information efforts, assisted by NHTSA surveys, to help convey the knowledge gained from research to the public.

- Monitor new in-vehicle technologies to determine how well manufacturers have evaluated their impact on safety prior to their introduction into the market place.

- Continue to encourage the development and deployment of technologies that can address the safety problems caused by driver distraction.

Our future research will cover many issues, including the effort to identify and develop methods to assess the safety implications of distractions that result from a driver's use of in-vehicle devices. The agency's National Advanced Driving Simulator, which will become operational this June, will be used for a portion of this research. The results of these efforts will be used to support the development of countermeasures that will minimize driver distraction.

Over a dozen new studies are planned by NHTSA over the next two years. One will equip vehicles people actually own with data recorders to help us determine how long, how frequently, and under what traffic circumstances drivers take their eyes off the road. We also have begun a cooperative project with industry to

develop methods to measure workload, develop workload management protocols, and determine the distraction potential of various in-vehicle technologies.

Finally, like many highway safety challenges, the problem of driver distraction as it relates to particular electronic devices brought into, installed or integrated in motor vehicles is one that will require all interests coming together to contribute to its resolution.

Mr. Chairman, this concludes my statement. I would be pleased to answer any questions.